

Claims

What is claimed is:

1. A diaphragm valve comprising:
 - a fluid passageway passing through a valve body;
 - a diaphragm for sealing said fluid passageway; and
 - a valve seat, wherein said valve seat includes one or more protrusions for securing the valve seat to the valve body.
2. The diaphragm valve of claim 1, wherein said valve seat is an insert formed separate from said valve body.
3. The diaphragm valve of claim 1, wherein said valve seat is inserted within a valve seat recess.
4. The diaphragm valve of claim 1, wherein said valve is inserted within a valve seat recess formed by an outer body wall and open to said fluid passageway.
5. The diaphragm valve of claim 4, wherein said open side of said valve seat is flush with said fluid passageway at a point where the valve seat and the valve body meet.
6. The diaphragm valve of claim 1, wherein said valve seat includes a raised sealing surface that generally matches the contour of a surface on said diaphragm.
7. The diaphragm valve of claim 1, wherein at least some portion of said valve seat is case hardened.
8. The diaphragm valve of claim 7, wherein said hardened portion of said valve seat is substantially free from carbides.
9. The diaphragm valve of claim 1, wherein the valve seat is greater than 55 Rockwell C.
10. The diaphragm valve of claim 1, wherein the valve seat is harder than the diaphragm.
11. The diaphragm valve of claim 1, wherein at least one of said one or more protrusions is on an outer edge of said metal valve seat.

12. The diaphragm valve of claim 1, wherein at least one said one or more protrusions is angled with respect to a center radius of the metal valve seat.
13. The diaphragm valve of claim 1, wherein at least one of said one or more protrusions is angled away from a seat bottom portion.
14. The diaphragm valve of claim 1, wherein said valve seat is metal.
15. The diaphragm valve of claim 1, wherein at least some portion of said valve seat is hardened.
16. The diaphragm valve of claim 1 further comprising a thin layer of polymeric material covering one or more surfaces of said valve seat.
17. A diaphragm valve comprising:
 - a fluid passageway disposed within a valve body;
 - a diaphragm for sealing said fluid passageway; and
 - a valve seat insert comprising an inner circumferential surface, wherein said inner circumferential surface is substantially flush with said fluid passageway at a point where the valve seat and valve body meet.
18. The diaphragm valve of claim 17, wherein said valve seat insert inner circumferential surface forms a continuous flow path with said fluid passageway.
19. The diaphragm valve of claim 17, wherein said valve seat insert inner circumferential surface is formed along the same axis as the fluid passageway.
20. The diaphragm valve of claim 17, wherein said valve seat insert further comprises a seat sealing surface, wherein said sealing surface is located proximate to said fluid passageway.
21. The diaphragm valve of claim 17, wherein said valve seat insert further comprises one or more protrusions for securing the valve seat to the valve body.

22. The diaphragm valve of claim 21, wherein said one or more protrusions form a seal surface between said valve seat and the valve body.
23. The diaphragm valve of claim 17, wherein at least some portion of the valve seat is hardened.
24. The diaphragm valve of claim 17, wherein at least some portion of the valve is case hardened.
26. The diaphragm valve of claim 17, wherein the valve seat is harder than the diaphragm.
27. A valve seat comprising:
 - a generally annular seat body; and
 - one or more protrusions located on one or more surfaces of said seat body, wherein said one or more protrusions are used to secure and seal the valve seat.
28. The valve seat of claim 27, further comprising a sealing surface associated with said seat body.
29. The valve seat of claim 28, wherein said sealing surface is located along a top portion of the seat body, proximate to an inner surface of said valve seat.
30. The valve seat of claim 27, wherein at least some portion of the valve seat is hardened.
31. The valve seat of claim 27, wherein at least some portion of the valve seat is case hardened.
32. The valve seat of claim 27, wherein said valve seat is harder than a diaphragm with which it is used.
33. The valve seat of claim 27, wherein said valve seat is greater than 55 Rockwell C.
34. The valve seat of claim 27, wherein at least one of said one or more protrusions is angled with respect to the center radius of said valve seat.

35. A valve seat for a diaphragm valve, wherein at least some portion of the valve seat is hardened to greater than 55 Rockwell C.
36. The valve seat of claim 35, wherein said seat is case hardened.
37. The valve seat of claim 35 further comprising one or more protrusions located on one or more surfaces of said valve seat.
38. The valve seat of claim 35 further comprising a thin layer of polymeric material applied to one or more surfaces of said valve seat.
39. The valve seat of claim 35 wherein said valve seat is metal or ceramic.
40. The valve seat of claim 35, wherein said valve seat includes a sealing surface, said sealing surface being selectively case hardened.
41. A diaphragm valve comprising:
 - a fluid passageway disposed within a valve body;
 - a diaphragm for sealing said fluid passageway; and
 - a thermally and chemically inert valve seat insert, wherein said valve seat can be secured to a portion of the valve body.
42. The diaphragm valve of claim 41 wherein said valve seat insert comprises one or more protrusions extending from one or more surfaces of said valve seat.
43. A diaphragm valve comprising:
 - a fluid passageway disposed within a valve body;
 - a metal diaphragm for sealing said fluid passageway; and
 - a valve seat, wherein said valve seat is harder than said metal diaphragm.
44. The diaphragm valve of claim 43, wherein said valve seat is an insert.
45. The diaphragm valve of claim 43, wherein said diaphragm is comprised of ElgiloyTM.

46. The diaphragm valve of claim 43, wherein said valve seat is greater than 55 Rockwell C.
47. The diaphragm valve of claim 43, wherein said valve seat is metal.
48. The diaphragm valve of claim 43, wherein said valve seat is ceramic.
49. The diaphragm valve of claim 43, wherein at least some portion of the valve seat is hardened.
50. The diaphragm valve of claim 43, wherein at least some portion of the valve is case hardened.
51. The diaphragm valve of claim 43, wherein at least some portion of the valve is carburized.
52. The diaphragm valve of claim 43, wherein said valve seat further includes a thin layer of polymeric material on one or more surfaces of said valve seat.
53. The diaphragm valve of claim 43, wherein said valve seat further comprises one or more protrusions extending from one or more surfaces of said valve seat.
54. The diaphragm valve of claim 43, wherein said valve seat comprises one or more protrusions that are angled with respect to the center radius of said valve seat.
55. The diaphragm valve of claim 43, wherein said valve seat is harder than said valve body.
56. The diaphragm valve of claim 43, wherein a valve seat comprising an inner circumferential surface, wherein said inner circumferential surface is flush with said fluid passageway at a point where the valve seat and valve body meet.
57. The diaphragm valve of claim 56, wherein said valve seat inner circumferential surface forms a continuous flow path with said fluid passageway.
58. The diaphragm valve of claim 56, wherein said valve seat inner circumferential surface is formed along the same axis as the fluid passageway.

59. The diaphragm valve of claim 56, wherein said valve seat further comprises a seat sealing surface, wherein said sealing surface is located proximate to said fluid passageway.
60. A method of staking a valve seat insert comprising the steps of:
inserting a valve seat insert into a recess formed in a valve body;
providing one or more protrusions on one or more surfaces of said valve seat insert; and
digging said one or more protrusions into at least one side wall of said valve body.
61. The method of claim 60, wherein said valve seat insert is metal.
62. The method of claim 60, further comprising the step of hardening at least some portion of said valve seat insert.
63. The method of claim 60 wherein said valve seat insert is harder than a diaphragm with which it is used.
64. A hardened metal valve seat insert, wherein said valve seat insert is removable.